

CLAIMS

1. A method for detecting a biochemical reagin comprising the steps of:
hybridizing a biochemical specimen with probe nucleic acids on a biochip having a probe nucleic acid forming a loop structure and arrayed on one or two or more electrodes provided on a surface of a substrate or substrate analog or a probe nucleic acid of said configuration with a label modification added in advance; and
detecting/discriminating a complex of the probe nucleic acid forming a double chain with the biochemical specimen by means of at least one of electrical, magnetic or optical changes on the surface of the biochip.
2. A method for detecting a biochemical reagin comprising the steps of
hybridizing a biochemical specimen with a probe nucleic acid on a biochip having a probe nucleic acid forming a loop structure and arrayed on one or two or more electrodes provided on a surface of a substrate or substrate analog or a probe nucleic acid of said configuration with a label modification added in advance;
modifying with a label either during or after hybridization one or both of the biochemical specimen and the probe nucleic acid forming a double chain; and
detecting/discriminating a complex of the probe nucleic acid forming a double chain with the biochemical specimen by means of at least one of electrical, magnetic or optical changes on the surface of the biochip.

3. A method for detecting a biochemical reagin comprising the steps of:

hybridizing a biochemical specimen modified in advance with a label with a probe nucleic acid on a biochip having a probe nucleic acid forming a loop structure and arrayed on one or two or more electrodes provided on a surface of a substrate or substrate analog or a probe nucleic acid of said configuration with a label modification added in advance; and detecting/discriminating a complex of the probe nucleic acid forming a double chain with the biochemical specimen by means of at least one of electrical, magnetic or optical changes on the surface of the biochip.

4. A method for detecting a biochemical reagin comprising the steps of

hybridizing a biochemical specimen modified in advance with a label with a probe nucleic acid on a biochip having a probe nucleic acid forming a loop structure and arrayed on one or two or more electrodes provided on a surface of a substrate or substrate analog or a probe nucleic acid of said configuration with a label modification added in advance;

modifying with a label either during or after hybridization one or both of the biochemical specimen and the probe nucleic acid forming a double chain; and

detecting/discriminating a complex of the probe nucleic acid forming a double chain with the biochemical specimen by means of at least one of electrical, magnetic or optical changes on the surface of the biochip.

5. A method for detecting a biochemical reagin according to any of Claims 1 through 4, wherein in the detection/discrimination step measurement results obtained from measurements to assess at least one of electrical, magnetic and optical changes to the surface of the biochip before the hybridization operation are used as the standard for comparing the measurement results for the biochip following each step.

6. A method for detecting a biochemical reagin according to any of Claims 1 through 4, wherein in the detection/discrimination step measurements are performed before and after the hybridization operation and/or before and after the label modification operation to assess at least one of electrical, magnetic and optical changes to the surface of the biochip, and these results are compared.

7. A method for detecting a biochemical reagin according to any of Claims 1 through 4, wherein in the detection/discrimination step measurements are performed before the hybridization operation to assess at least one of electrical, magnetic and optical changes to the surface of a biochip having a plurality of electrodes, and the relative amounts of probe nucleic acids on each electrode are calculated in advance and used as a correction reference for the measurement values after each step.

8. A method for detecting a biochemical reagin according to any of Claims 1 through 4, wherein the pre-modification with a label of the probe nucleic acid or biochemical specimen is multi-stage modification of two or three or more stages in which a second label is added targeting a previous attached first label.

9. A method for detecting a biochemical reagin according to any of Claims 1 through 4, wherein the method of modifying the probe nucleic acid or biochemical specimen with a label is multi-stage modification in two or three or more stages in which modification with a first label is followed by modification with a second label targeting the first label.

10. A method for detecting a biochemical reagin according to any of Claims 1 through 4, wherein the label is selected from among fine metal particles (including Si), magnetic particles, ceramic fine particles, fluorescent labels, fluorescent dyes, dyes, chemical colorants and semiconductors.

11. A method for detecting a biochemical reagin according to any of Claims 1 through 4, wherein the method of detecting/discriminating electrical changes on the surface of a biochip is a method of detecting/discriminating at least one of changes in current values, voltage values or resistance values on a biochip or electrode, or changes in capacitance on the surface of a biochip.

12. A method for detecting a biochemical reagin according to any of Claims 1 through 4, wherein the method of detecting/discriminating as electrical and magnetic changes on the surface of a biochip comprises the steps of:

detecting/discriminating at least one of changes in current values, voltage values or resistance values on a biochip or electrode, or changes in capacitance on the surface of a biochip; and
magnetically detecting/discriminating a signal from a complex forming a double chain.

13. A method for detecting a biochemical reagin according to any of Claims 1 through 4, wherein the method of detecting/discriminating as electrical and optical changes on the surface of a biochip comprises the steps of:

detecting/discriminating at least one of changes in current values, voltage values or resistance values on a biochip or electrode or changes in capacitance on the surface of a biochip; and

optically detecting/discriminating a signal from a complex forming a double chain.

14. A method for detecting a biochemical reagin according to any of Claims 1 through 4, wherein the method of detecting/discriminating as electrical, magnetic and optical changes on the surface of a biochip comprises the steps of:

detecting/discriminating at least one of changes in current values, voltage values or resistance values on a biochip or electrode, or changes in capacitance on the surface of a biochip; and

magnetically and optically detecting/discriminating signals from a complex forming a double chain.

15. A biochip constituted by a substrate or analog thereof which has at least one electrode formed on the surface and having probe nucleic acids arrayed on the surface of said electrode, each probe nucleic acid having a loop structure.

16. A biochip constituted by a substrate or analog thereof which has at least one electrode formed on the surface and having probe nucleic acids arrayed on the surface of said electrode, wherein the arrayed probe nucleic acids have a loop structure in which the principal part which binds complementarily with the biochemical specimen is located on the substrate or substrate analog side.

17. A biochip constituted by a substrate or analog thereof which has at least one electrode formed on the surface and having probe nucleic acids arrayed on the surface of said electrode, wherein the arrayed probe nucleic acids have a loop structure in which the free end not fixed to the surface of the electrode or the site thereof capable of being modified with a label is located on the substrate or substrate analog side.

18. A biochip constituted by a substrate or analog thereof which has at least one electrode formed on the surface and having probe nucleic acids arrayed on the surface of said electrode, wherein the arrayed probe nucleic acids have a loop structure in which a site modified with a first label which allows further modification with a second label is located on the substrate or substrate analog side.

19. A biochip constituted by a substrate or analog thereof which has at least one electrode formed on the surface and having probe nucleic acids arrayed on the surface of said electrode, wherein the arrayed probe nucleic acids have a loop structure in which a previously attached label is located on the substrate or substrate analog side.

20. A biochip according to Claim 18 or 19, wherein the label is selected from metal fine particles (including Si), magnetic particles, ceramic fine particles, fluorescent labels, fluorescent dyes, dyes, chemical colorants and semiconductors.

21. A biochip according to any of Claims 15 through 19, wherein the substrate or substrate analog material is glass or semiconductor silicon.

22. A biochip according to any of Claims 15 through 19, wherein the substrate or analog thereof is capable of being embedded in a separately prepared electrical circuit board.